

Supplementary Information

Mercury Plumes in the Global Upper Troposphere Observed during Flights with the CARIBIC Observatory from May 2005 until June 2013. *Atmosphere* 2014, 6, 342–369.

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This supplementary supports the main text as follows:

Figure S1. Non-methane hydrocarbons and CH₃Cl in whole air samples taken during the flight #334 on 21/22 March 2011, from Cape Town to Frankfurt.

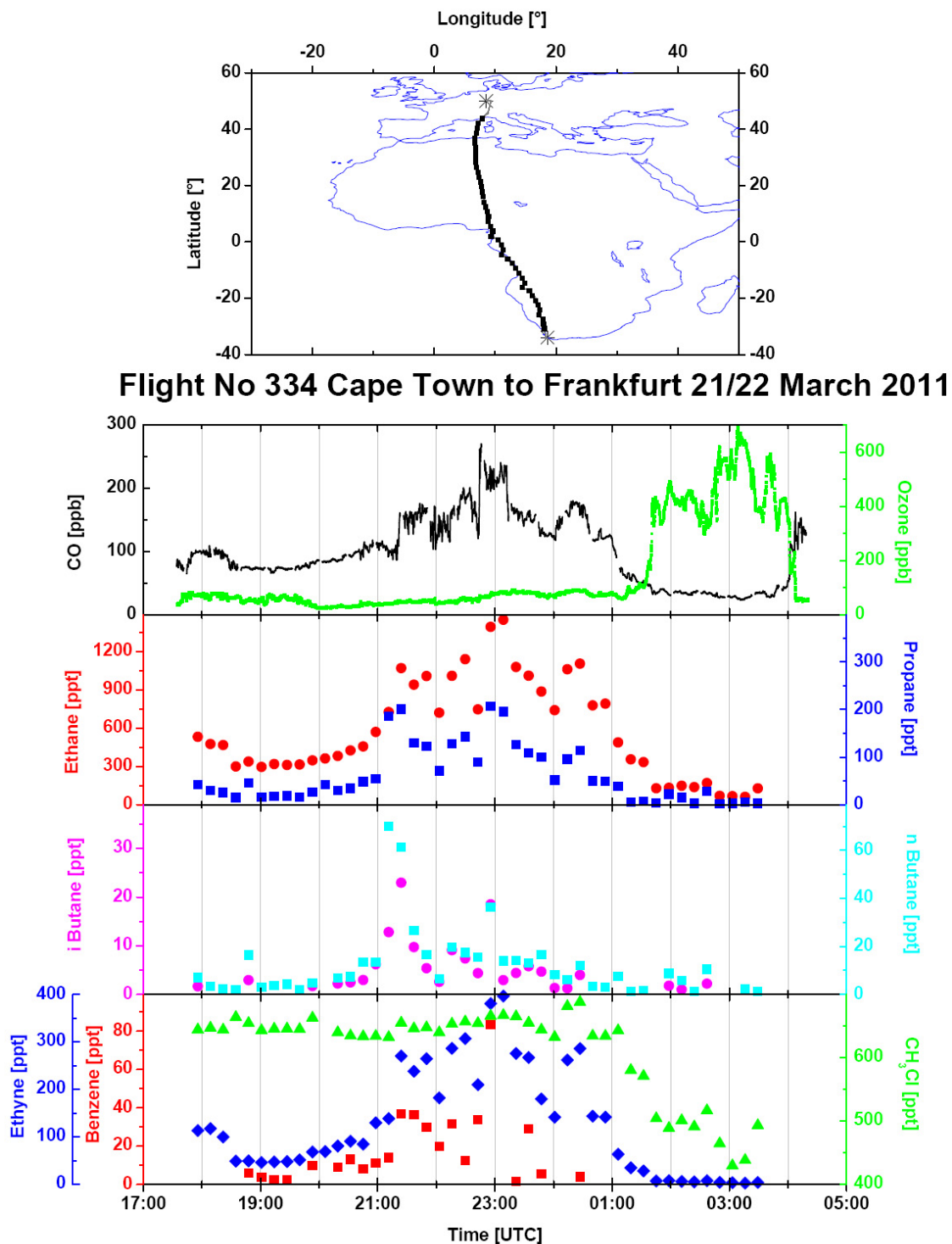


Table S1. Plumes with statistically significant Hg vs CO correlations observed over East Asia.

Flight#	Destination	Date	Time (UTC)	Coordinates	Slope ($\mu\text{g}\cdot\text{m}^{-3}\cdot\text{ppb}^{-1}$)	R, n	Signif. (%)
110	Guangzhou	20.5.2005	5:12:30–6:42:30	23.41°N, 94.40°E–23.89°N, 108.02°E	8.88 ± 2.99	0.7935, 7	95
153	Guangzhou	30.5.2006	15:47:00–16:57:00	24.39°N, 112.37°E–29.31°N, 104.86°E	6.64 ± 1.42	0.9017, 7	99
157	Guangzhou	6.7.2006	16:25:30–17:25:30	26.14°N, 108.22°E–31.13°N, 101.21°E	6.59 ± 0.69	0.9738, 7	99.9
158	Guangzhou	1.8.2006	2:08:00–3:28:00	43.66°N, 74.75°E–38.86°N, 88.44°E	8.83 ± 1.47	0.9148, 9	99.9
158	Guangzhou	1.8.2006	4:08:00–5:18:00	36.67°N, 94.11°E–30.77°N, 103.21°E	11.29 ± 1.99	0.9168, 8	99
158	Guangzhou	1.8.2006	5:28:00–6:28:00	30.41°N, 104.67°E–23.89°N, 111.71°E	7.39 ± 1.00	0.9493, 8	99.9
161	Guangzhou	1.8.2006	15:57:00–16:57:00	24.31°N, 112.82°E–28.02°N, 105.52°E	8.40 ± 1.53	0.9259, 7	99
161	Guangzhou	1.8.2006	19:17:00–20:17:00	38.81°N, 88.30°E–42.86°N, 79.84°E	10.36 ± 0.85	0.9835, 7	99.5
161	Guangzhou	1.8.2006	22:07:00–23:07:00	49.48°N, 64.38°E–50.86°N, 53.51°E	11.20 ± 3.38	0.7972, 7	95
164	Manila	8.9.2006	12:47:00–13:27:00	19.06°N, 117.73°E–22.66°N, 114.04°E	4.11 ± 0.71	0.9577, 5	95
165	Guangzhou	8.9.2006	15:53:00–18:03:00	24.19°N, 112.16°E–33.58°N, 97.40°E	10.04 ± 1.33	0.9074, 14	99.9
166	Guangzhou	20.10.2006	3:53:00–4:53:00	37.03°N, 91.38°E–32.07°N, 99.58°E	3.48 ± 0.72	0.9070, 7	99
166	Guangzhou	20.10.2006	5:03:00–6:33:00	31.04°N, 100.19°E–24.26°N, 110.99°E	2.28 ± 0.91	0.6617, 10	95
169	Guangzhou	20.10.2006	15:59:00–17:09:00	24.34°N, 11.99°E–30.00°N, 104.17°E	4.47 ± 1.58	0.7544, 8	95
169	Guangzhou	20.10.2006	17:49:00–20:29:00	32.13°N, 99.64°E–43.91°N, 78.63°E	3.18 ± 1.07	0.6063, 17	99
170	Guangzhou	15.11.2006	6:59:00–7:49:00	28.13°N, 105.52°E–23.86°N, 111.58°E	7.69 ± 1.23	0.9523, 6	99
173	Guangzhou	15.11.2006	18:26:00–20:26:00	30.27°N, 102.46°E–8.75°N, 88.40°E	16.63 ± 4.21	0.7432, 13	99
190	Guangzhou	23.5.2007	6:40:00–8:40:00	36.88°N, 104.06°E–23.79°N, 111.60°E	11.06 ± 2.79	0.7568, 13	99
194	Guangzhou	22.6.2007	7:28:00–8:48:00	31.08°N, 104.38°E–23.76°N, 111.63°E	6.43 ± 1.87	0.7904, 9	95
198	Guangzhou	18.7.2007	5:25:30–8:00:30	39.58°N, 101.04°E–24.67°N, 112.71°E	12.90 ± 0.81	0.9451, 32	99.9
199	Manila	18.7.2007	10:33:30–11:28:30	20.51°N, 115.99°E–15.32°N, 120.59°E	12.25 ± 2.97	0.7842, 12	99
202	Guangzhou	15.8.2007	7:21:30–7:56:30	25.72°N, 108.86°E–22.97°N, 112.48°E	13.20 ± 3.46	0.8348, 8	99
203 + 204	Manila	15.8.2007	9:55:30–15:28:30	22.68°N, 113.41°E–19:88°N, 116.90°E	5.22 ± 1.22	0.7502, 16	99.9
210	Guangzhou	25.10.2007	7:38:30 – 8:28:30	26.90°N, 106.31°E – 22.87°N, 112.14°E	8.04 ± 2.54	0.7392, 10	95
213	Guangzhou	25.10.2007	17:25:30 – 18:35:30	24.24°N, 112.68°E – 28.50°N, 105.53°E	8.16 ± 1.24	0.8759, 15	99.9
214	Guangzhou	14.11.2007	6:19:30 – 8:14:30	30.99°N, 100.05°E – 23.18°N, 113.35°E	6.10 ± 1.97	0.5378, 24	99
300	Osaka	24.6.2010	2:58:30 – 4:03:30	37.41°N, 125.75°E – 40.47°N, 116.79°E	4.40 ± 0.51	0.9454, 11	99.9
316	Osaka	22.10.2010	1:59:30 – 3:29:30	39.67°N, 138.00°E – 50.86°N, 135.17°E	10.37 ± 2.29	0.7283, 19	99.9
331	Osaka	26.2.2011	23:30:30 – 0:20:30	39.43°N, 137.56°E – 34.68°N, 133.97°E	9.99 ± 2.36	0.8111, 11	99
332	Osaka	27.2.2011	2:55:30 – 3:45:30	34.99°N, 133.48°E – 37.30°N, 126.93°E	8.40 ± 2.98	0.6731, 11	95
383	Seoul	29.3.2012	1:42:00 – 2:22:00	38.74°N, 119.16°E – 37.06°N, 125.39°E	5.63 ± 0.95	0.9595, 5	99

Table S2. Other plumes with statistically significant Hg vs. CO correlations.

Flight#	Destination	Date	Time (UTC)	Coordinates	Slope($\text{pg}\cdot\text{m}^{-3}\cdot\text{ppb}^{-1}$)	R, n	Signif.(%)
123–125	São Paulo, Santiago	31.8.2005	10:33:30–23:37:30	24.30°S, 48.16°W–5.91°S, 39.69°W	1.08 ± 0.24	0.7722, 16	99.9
126–128	São Paulo, Santiago	5.10.2005	7:08:30–19:01:30	11.51°S, 37.48°W–25.01°S, 47.52°W	1.30 ± 0.27	0.7270, 22	99.9
206	Toronto	17.9.2007	18:15:30–19:20:30	46.72°N, 64.17°W–45.59°N, 75.81°W	6.93 ± 1.00	0.8928, 14	99.9
241	Chennai	16.7.2008	1:56:30–2:26:30	34.34°N, 56.07°E–37.10°N, 52.46°E	9.98 ± 1.88	0.9206, 7	99
242	Denver	16.7.2008	21:21:30–21:46:30	42.98°N, 102.79°W–40.18°N, 104.27°W	11.42 ± 1.99	0.9437, 6	99
248	Chennai	10.9.2008	15:47:30–16:47:30	23.92°N, 69.28°E–18.02°N, 74.07°E	4.99 ± 2.07	0.5807, 13	95
249	Chennai	10.9.2008	21:55:30–23:05:30	18.54°N, 73.42°E–24.42°N, 65.65°E	9.95 ± 1.86	0.8250, 15	99.9
262	Cape Town	11.3.2009	3:53:30–6:03:30	4.80°N, 9.47°E–11.65°S, 14.09°E	3.36 ± 1.07	0.6688, 14	99
321	Cape Town	13.12.2010	3:07:30–6:32:30	11.67°N, 15.11°E–14:07°S, 16.16°E	2.45 ± 0.80	0.4310, 42	99
326	Johannesburg	19.1.2011	20:07:30–23:07:30	13.58°S, 28.02°E–10.42°N, 10.42°E	7.45 ± 2.54	0.4128, 37	95
329	Cape Town	25.2.2011	2:26:30–6:16:30	18.44°N, 14.75°E–11.93°S, 16.25°E	2.18 ± 0.46	0.5788, 47	99.9
347	Bogotá	16.6.2011	16:47:30–17:47:30	42.63°N, 25.19°W–38.30°N, 33.15°W	1.33 ± 0.37	0.7350, 13	99
348	Bogotá	17.6.2011	7:35:30–8:45:30	30.79°N, 56.17°W–38:41°N, 48.47°W	1.48 ± 0.55	0.5977, 15	95
370	Chennai	15.12.2011	21:09:00–22:39:00	15.87°N, 76.56°E–22.41°N, 67.12°E	6.66 ± 2.35	0.7026, 10	95
379	Caracas	7.3.2012	18:07:00–19:27:00	17.84°N, 58.12°W–11.54°N, 65.56°W	3.25 ± 1.36	0.6679, 9	95
409	Bangkok	24.1.2013	5:27:00–7:07:00	20.15°N, 86.10°E–14.41°N, 99.69°E	5.31 ± 1.49	0.7799, 10	99
420	Bangkok	21.3.2013	17:32:00–19:32:00	14.57°N, 99.06°E–22.87°N, 86.46°E	8.40 ± 2.66	0.6792, 13	95

Table S3. Plumes with statistically significant Hg vs. CO₂ correlations.

Flight#	Destination	Date	Time (UTC)	Coordinates	Slope (pg·m ⁻³ ·ppm ⁻¹)	R, n	Signif. (%)
169	Guangzhou	20.10.2006	17:49:00–20:29:00	32.13°N, 99.64°E–43.91°N, 78.63°E	107.4 ± 45.0	0.5134, 17	95
190	Guangzhou	22.5.2007	6:40:00–8:40:00	36.88°N, 104.06°E–23.79°N, 111.60°E	128.3 ± 50.8	0.5947, 13	95
203 + 204	Manila	15.8.2007	9:55:30–14:58:30	22.68°N, 113.41°E–19.68°N, 117.07°E	624.6 ± 104.2	0.8703, 12	99.9
210	Guangzhou	24.10.2007	7:38:30–8:28:30	26.90°N, 106.31°E–22.87°N, 112.14°E	964.1 ± 292.0	0.7275, 8	95
211 + 212	Manila	25.10.2007	10:19:30–14:59:30	22.67°N, 113.40°E–19.23°N, 117.58°E	146.7 ± 58.3	0.6097, 12	95
213	Guangzhou	25.10.2007	17:40:30–18:35:30	24.75°N, 110.83°E–28.5°N, 105.53°E	471.1 ± 103.1	0.8342, 10	99
316	Osaka	22.10.2010	1:59:30–3:29:30	39.67°N, 138.00°E–50.86°N, 135.17°E	129.5 ± 27.5	0.7483, 19	99.9
331	Osaka	26.2.2011	23:30:30–00:15:30	39.43°N, 137.56°E–35.10°N, 134.16°E	266.3 ± 37.3	0.9286, 10	99.9
329	Cape Town	24.2.2011	2:26:30–6:16:30	18.44°N, 14.75°E–11.93°S, 16.25°E	14.4 ± 5.7	0.3524, 47	95
334	Cape Town	21.3.2011	17:56:30–18:56:30	30.75°S, 18.08°E–23.10°S, 17.15°E	239.4 ± 94.4	0.6165, 11	95
334	Cape Town	21.3.2011	21:16:30–1:01:30	5.33°S, 11.74°E–24.16°N, 7.23°E	21.9 ± 9.7	0.3220, 46	95
347	Bogota	16.6.2011	16:52:30–17:42:30	42.27°N, 25.88°W–38.67°N, 32.49°W	130.7 ± 53.4	0.6715, 9	95
241	Chennai	15.7.2008	1:56:30–2:36:30	34.34°N, 56.07°E–37.10°N, 52.46°E	75.7 ± 24.1	0.8137, 7	95
369	Chennai	15.12.2011	16:16:00–17:36:00	23.28°N, 71.19°E–14.81°N, 77.58°E	178.3 ± 46.1	0.9118, 5	95
370	Chennai	15.12.2011	21:09:00–22:39:00	15.87°N, 76.56°E–22.41°N, 67.12°E	121.3 ± 42.7	0.7039, 10	95
409	Bangkok	23.1.2013	5:27:00–7:07:00	20.15°N, 86.10°E–14.41°N, 99.69°E	99.7 ± 31.8	0.7396, 10	95
373	Chennai	16.1.2012	10:12:00–10:42:00	48.42°N, 12.50°E–47.09°N, 18.05°E	427.7 ± 65.4	0.9771, 4	95

Table S4: Plumes with significant Hg vs. CH₄ correlations.

Flight#	Destination	Date	Time (UTC)	Coordinates	Slope (pg·m ⁻³ ·ppb ⁻¹)	R, n	Signif. (%)
316	Osaka	22.10.2010	1:29:30–1:59:30	35.74°N, 136.93°E–39.67°N, 138.00°E	28.2 ± 3.3	0.9588, 8	99.9
316	Osaka	22.10.2010	1:59:30–3:29:30	39.67°N, 138.00°E–50.86°N, 135.17°E	10.8 ± 2.2	0.7032, 19	99.9
329	Cape Town	24.2.2011	2:26:30–6:16:30	18.44°N, 14.75°E–11.93°S, 16.25°E	4.8 ± 0.9	0.5583, 46	99.9
331	Osaka	26.2.2011	23:30:30–0:20:30	39.43°N, 137.56°E–34.68°N, 133.97°E	41.4 ± 8.5	0.7882, 11	99
370	Chennai	15.12.2011	21:09:00–22:39:00	15.87°N, 76.56°E–22.41°N, 67.12°E	14.6 ± 3.3	0.8007, 10	99
409	Bangkok	23.1.2013	5:27:00–7:07:00	20.15°N, 86.10°E–14.41°N, 99.69°E	9.1 ± 2.2	0.7976, 10	99

Figure S2. Non-methane hydrocarbons and CH₃Cl in whole air samples taken during the flight #348 on 17 June 2011, from Bogotá to Frankfurt.

